Newly Observed Lamellar Morphology in Linear Low-Density Polyethylene Blown Films	X10A

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This study details the morphological development and molecular orientation of linear low-density polyethylene (LLDPE) *blown films*. In the blown film process, crystallization takes place under stress and temperature gradient resulting in an anisotropic distribution of the lamellae crystallite. We use a combination of small and wide-angle x-ray scattering to investigate the detail morphological feature and orientation of a metallocene ethylene-hexene copolymer (density =0.918g/cm^3) blown films. The film exhibits an orthorombic crystalline structure with two oriented lamellae (*figure 1*). The first type is the commonly observed row-nucleated lamellae whose normal lies in the machine direction. The in-plane order in these lamellea are completely random. The second type of lamellae have their normal perpendicular to the machine direction and accounts for ca. 25% of the total crystallite. These lamellae has preferred crystalline orientation with the crystalline *a*- and *b*-axis aligned parallel and perpendicular to the machine direction. These results imply that two different crystallization mechanisms take place during the film blowing process.

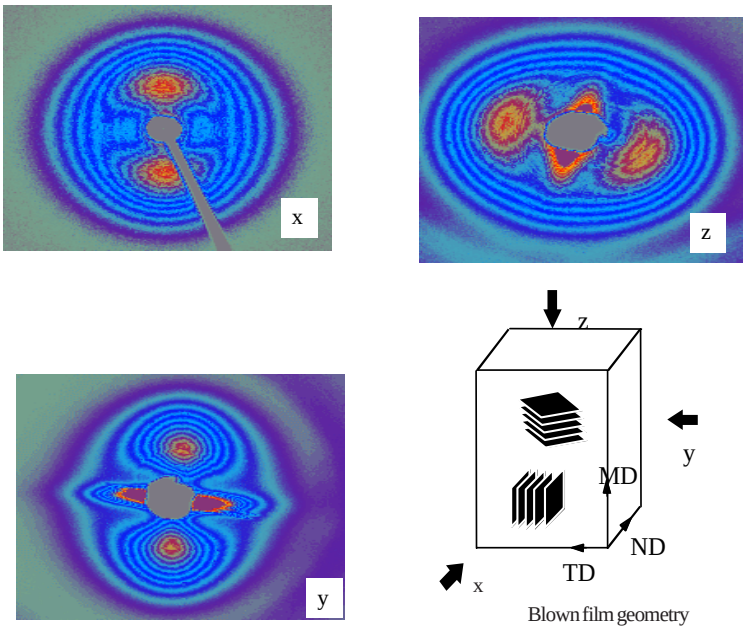

Figure 1. 2-D SAXS of the blown films showing the two oriented lamellae. Films were blown in the MD direction and SAXS patterns taken along the (x,y,z) direction.